

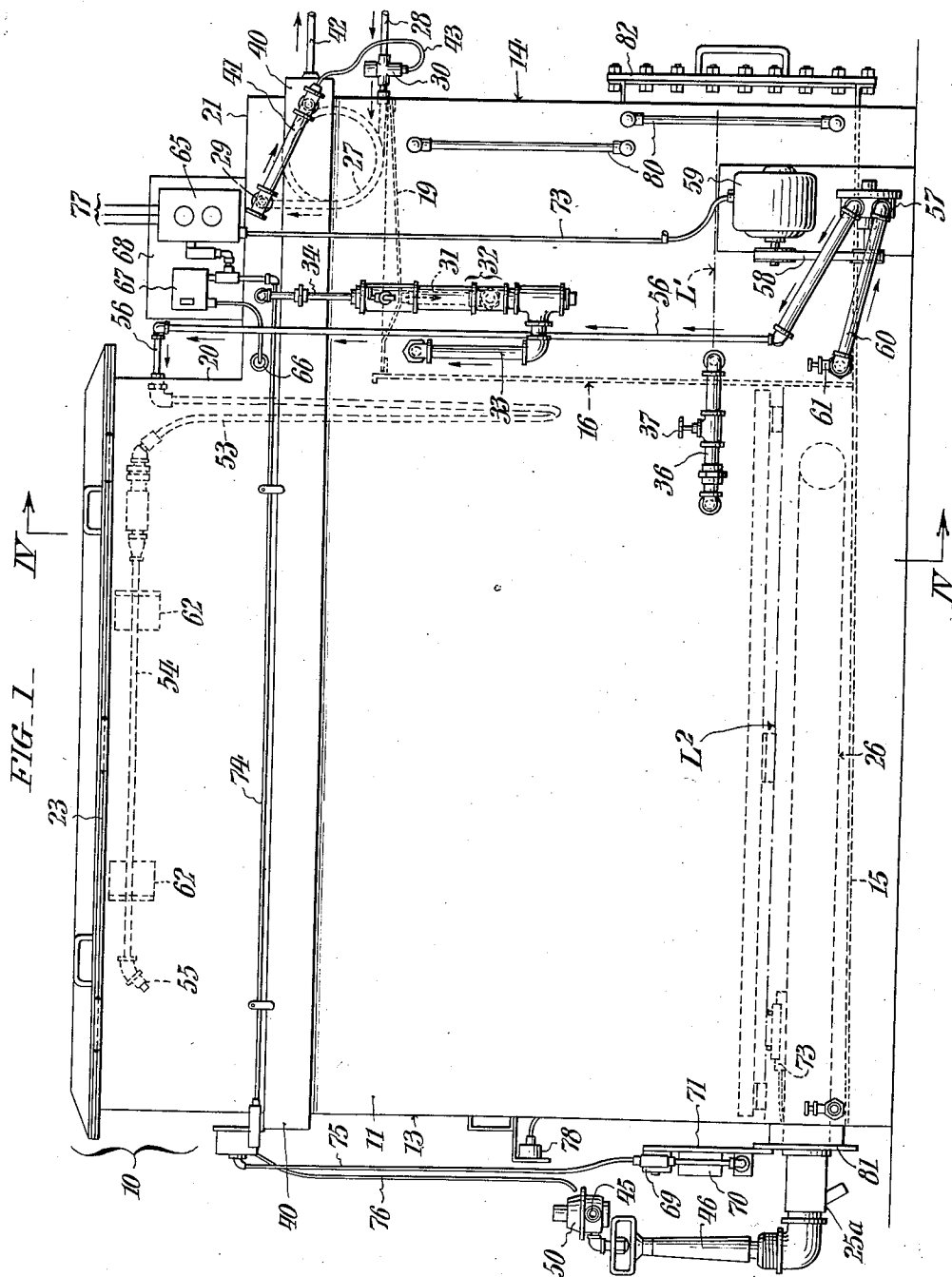
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T. J. KEARNEY
DEGREASING APPARATUS

2,700,645

Filed May 27, 1952

3 Sheets-Sheet 1



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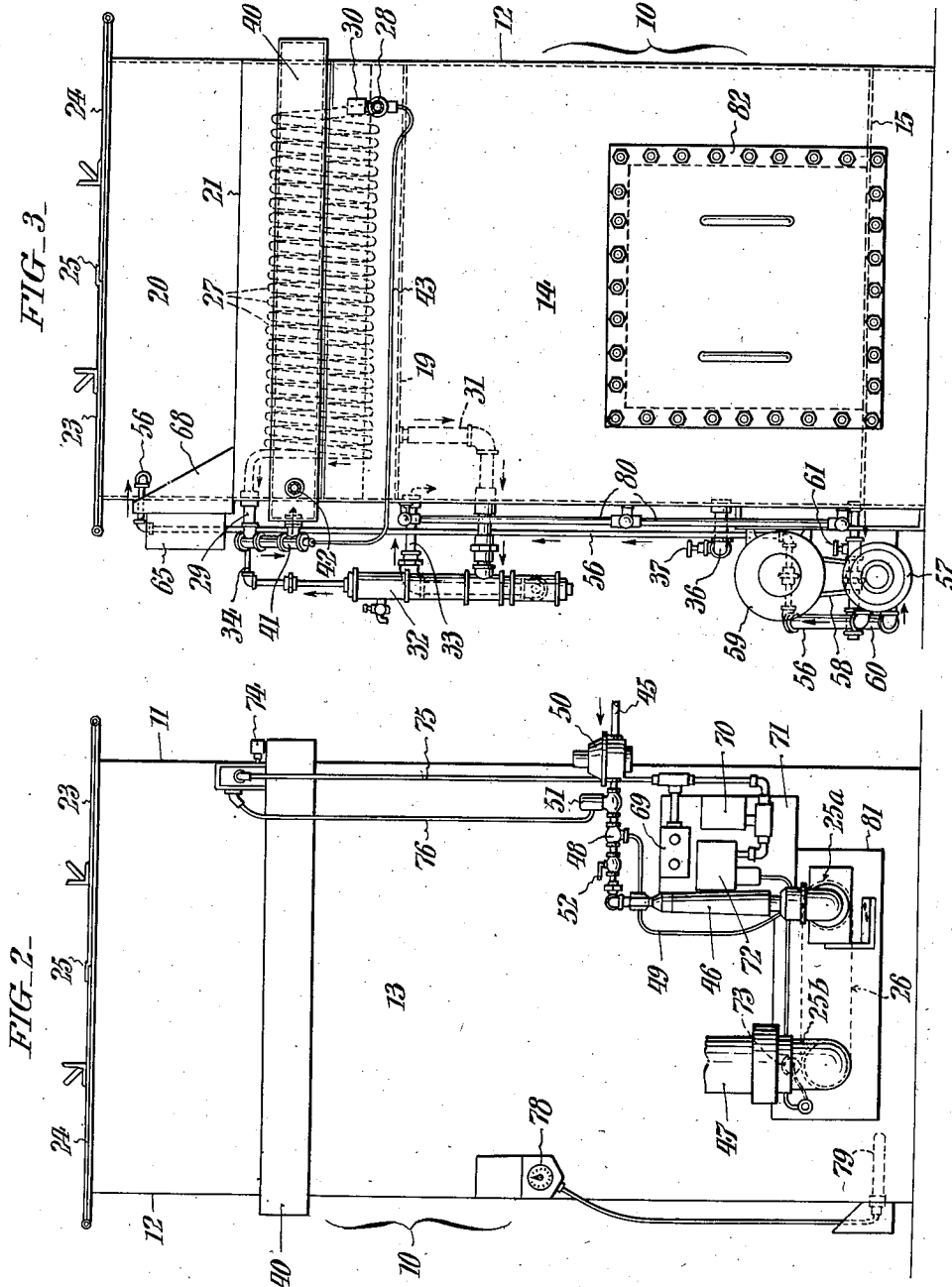
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DEGREASING APPARATUS

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4 Claims. (Cl. 202—170)

This invention relates to degreasing apparatus, that is to say, to apparatus useful in removing grease and dirt from machine parts and the like with the aid of chlorinated solvents, such as trichlorethylene, perchlorethylene, etc. In degreasing apparatus of the kind particularly referred to the solvent is boiled and continually cycled through liquid and vapor phases between an evaporating or work tank and an exteriorly located solvent storage reservoir, an upper vapor level limit being maintained in the tank by a jacket surrounding it at the top through which a fluid coolant is continually circulated, and the condensation resulting from the cooling being continually collected and conducted back into the reservoir for return by overflow to the tank where it is reheated and reused.

Heretofore, in such apparatus, the practice has been to employ a reservoir separate from and independent of the work tank, which added considerably to the cost of the apparatus; and to collect the condensate in a perimetric trough interiorly of the work tank, the trough being thus in the way incident to introducing the work into the tank from above for degreasing.

My invention has for its chief aims to overcome the above mentioned drawbacks which objectives are realized, as hereinafter more fully disclosed, by constructing the tank and the reservoir as a self-contained unit with condenser and condensate collecting means so disposed as to obviate the necessity of a trough in the work chamber, so that the walls of the latter are left without obstructions to interfere with ready introduction of the work thereinto.

Other objects and attendant advantages will appear from the following detailed description of the attached drawings wherein:

Fig. 1 is a view in front elevation of a degreasing apparatus conveniently embodying my invention.

Figs. 2 and 3 show the opposite end elevations of the apparatus.

Fig. 4 is a transverse sectional view taken as indicated by the angled arrows IV—IV in Fig. 1 and

Fig. 5 is a fragmentary view in longitudinal section, taken as indicated by the angled arrows V—V in Fig. 4.

As herein illustrated, my improved degreasing apparatus comprises a housing 10 which, in practice, is constructed from stout non-corrosive plate metal with plain flat and continuous opposite side and end walls 11, 12 and 13, 14 and with a somewhat sloped bottom 15. A transverse vertical partition 16 rising partway up from the bottom 15 of the housing 10 defines within the latter, a solvent evaporation and work tank 17, and a solvent storage reservoir 18. As shown reservoir 18 is closed at the top by a pan-like horizontal partition 19 which, as will be presently seen, serves as a vapor condensation collecting tray. From Figs. 4 and 5 it will be noted that tray 19 extends between the upper edge of vertical partition 16 and end wall 14 of housing 10, and from side wall 11 to side wall 12. End wall 14 reaches up to a level somewhat above tray 19, and extending horizontally from the top thereof to a wall section 20 in line with vertical partition 16, is a roof section 21, said wall section 20 terminating even with the tops of the side walls 11, 12 and the end wall 14. As a consequence of this construction, there is formed above storage tank 18 a lateral offset 22 which is in direct communication with tank 17 at the top.

The work to be degreased is introduced into tank 17 from above upon swinging open the cover doors indicated at 23 and 24, whereof the remote longitudinal edges are

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hinged to the side walls 11 and 12 of housing 10 and whereof the swinging edges overlap as at 25 in Figs. 2-4, when the covers are closed.

Arranged lengthwise of the bottom of tank 17 and submerged in the solvent in the latter, is a U tube 26 that constitutes a combustion chamber for gas used to boil off the solvent. The vapors thus released in chamber 17 are held as presently explained, at the level L in Figs. 4 and 5 and are condensed by the action of a condenser in the form of a helical coil 27 which is arranged transversely within the offset 22 adjacent the end wall 14 of housing 10, and through which cold water or other suitable fluid coolant is constantly passed, the coolant entering one end of the coil by way of a pipe 28 and leaving through a pipe 29, and the temperature of the incoming liquid being regulated by a thermostatic control 30 interposed in pipe 28. The condensate drips from coil 27 into collecting tray 19, and drains from the latter through an outlet pipe 31 which extends through the side wall 11 of housing 10 to a water separator 32 wherefrom the water free solvent is conducted back into storage reservoir 18 through a pipe 33. Leading from the top of separator and terminating in the wall 11 of housing 10 is a spud vent tube 34. The solvent in storage tank 18 is maintained at the level L' by an overflow pipe 36 which discharges into tank 17, and in which is interposed, for a purpose later on explained, a hand valve 37, the normal top level of the solvent in the tank being indicated at L².

Surrounding the housing 10 in the horizontal plane of the offset 22 is a jacket 40 to which the liquid coolant is conducted, after traversing coil 27, through a branch pipe 41 connected to pipe 29, and from which it is finally discharged through a pipe 42. The jacket 40 prevents upward heat transfer through the housing walls and thus acts to maintain the desired vapor limit level at L² within tank 17 and so minimizes solvent vapor losses which would otherwise occur if the housing walls at this point should exceed room temperature by a few degrees. As best shown in Fig. 3, a tube connection 43 extends from thermostatic condenser water temperature control 28 to pipe 41.

The gas used for heating in the illustrated instance, is delivered from a suitable source of supply (not shown) by way of a pipe 45 to a torch burner designated 46 in Figs. 1 and 2, which is connected to the inlet end 25a of combustion tube 26, the outlet end 25b of the latter being connected to a suitable flue 47. Gas for the operation of a pilot associated with the burner 46 is delivered from a valve 48 in pipe 45 through a connecting tube 49. Also interposed in gas pipe 45 is a gas regulator 50, a magnetically actuated gas valve 51, and a hand valve 52.

For the removal of grease and dirt from parts having intricate recesses, I have provided a hose 53 with a lance 54 which terminates in a spray nozzle 55. As shown, the hose 53 is connected to the inner end of a pipe 56 which extends through end wall section 20 of housing 10, and then downward at the exterior to a rotary pump 57 arranged to be driven, through a belt 58, from an electric motor 59. Pump 57 draws solvent from storage tank 18 through a pipe 60 having a manual regulating valve 61 interposed therein. When its use is not required, the lance 54 is rested upon brackets 62 at the inside of the front wall 11 of housing 10 as shown in Fig. 1.

The additional facilities relied upon to control functioning of the apparatus include a start and stop switch 65 (Fig. 1) for the pump motor 59; a bulb thermostat 66 which is located in offset 22 and which affects a vapor level control 67 mounted, with said switch 65, on a panel 68 over the storage reservoir 18; a push button control pilot starter switch 69 (Fig. 2) mounted, with a thermopilot relay 70, on a panel 71 at the left hand end of the apparatus. Also mounted on panel 71 is a tube temperature control 72 which is governed by the sensitive element of a thermostat 73 (Fig. 2) rigidly secured on the wall of the combustion tube 26 inside tank 17. The purpose of the thermostatic element 73 is to prevent overheating and decomposition of the solvent to prevent the solvent oil mixture from possibly reaching its flash point, and to prevent exposure of an overheated tube to the solvent vapors in the event that the tube is not fully submerged and the solvent and/or its vapors

are subjected to or contact with a metal surface of the tube at a temperature in excess of the predetermined critical degree or degrees.

The various electrical instrumentalities which have been mentioned are connected by wiring concealed in protective tubing 74, 75 and 76, and the current for their actuation is supplied from a power line 77 whereof the leads extend into the casing of the pump motor switch 65 as shown in Fig. 1.

A dial thermometer 78 (Figs. 1 and 2) actuated from a bulb 79 immersed in the solvent at the bottom of tank 17 indicates the temperature of the solvent at all times; and the solvent level in storage reservoir is registered at all times by the sight glasses shown at 80 in Figs. 1 and 3.

Tank 17 is accessible for cleaning upon removal of a panel 81 (which carries heating coil 26) from over an opening in the left hand end wall 13 of housing 10. Reservoir 18 is likewise accessible upon removal of a panel 82 (Figs. 1 and 3) from over a manhole in the right hand end wall 14 of housing 10.

Having thus described my invention, I claim:

1. In a degreasing apparatus for use in treating with solvents such as trichlorethylene, a horizontally elongate quadrangular housing having continuous, straight, interiorly-unobstructed side walls, end walls and bottom; a transverse vertical partition extending part way up within the housing from the bottom adjacent one end of the housing; a tray-like horizontal partition extending between the top of the vertical partition to said end wall and from side wall to side wall and a roof portion extending inward from said end wall above the horizontal partition and terminating in the plane of the vertical partition, with resultant setting apart within the housing, an open top solvent evaporation tank into which work to be cleaned is introduced from above, a smaller solvent storage reservoir beneath the horizontal partition, and an offset above the horizontal partition in full communication with the evaporation chamber and positioned substantially below the top of the evap-

oration tank; a solvent overflow outlet from the storage reservoir to the evaporation tank; heating means for boiling the solvent in the tank; a packet through which coolant is passed extending perimetrically about the housing medially of the height of the offset aforesaid for maintaining a top limit level for the vapor released from the hot solvent in the tank; a horizontally arranged helical condenser coil extending crosswise of the housing from side to side in the offset aforesaid at an elevation corresponding to that of the jacket through which coolant is circulated; and means for conducting the condensate released from the condenser coil and collected by the tray-like horizontal partition for return to the storage reservoir.

2. Degreasing apparatus according to claim 1, wherein the jacket is connected in series with the condenser coil.

3. Degreasing apparatus according to claim 1, wherein the terminal end of the condenser coil is connected to the inlet of the jacket to receive the coolant after it has traversed the coil.

4. Degreasing apparatus according to claim 1, wherein the terminal end of the condenser coil is connected to the inlet of the jacket to receive the coolant after it has traversed the coil; and a thermostatic means interposed in the inlet of the coil for automatically controlling the temperature of the coolant.

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